

# PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

## PCT

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL SEARCH REPORT AND  
THE WRITTEN OPINION OF THE INTERNATIONAL  
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

To: Ada O Wong  
Morgan Lewis & Bockius LLP  
2 Palo Alto Square  
3000 El Camino Real Suite 700  
Palo Alto CA 94306

Date of mailing  
(day/month/year) **16 JAN 2008**

Applicant's or agent's file reference  
**61136-5004WO**

**FOR FURTHER ACTION** See paragraphs 1 and 4 below

International application No.  
**PCT/US 06/38024**

International filing date  
(day/month/year) **29 September 2006 (29.09.2006)**

Applicant **AB-CWT LLC**

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

**Filing of amendments and statement under Article 19:**

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

**When?** The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

**Where?** Directly to the International Bureau of WIPO, 34 chemin des Colombettes  
1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

**For more detailed instructions,** see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

**4. Reminders**

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US  
Mail Stop PCT, Attn: ISA/US  
Commissioner for Patents  
P.O. Box 1450, Alexandria, Virginia 22313-1450  
Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300  
PCT OSP: 571-272-7774

**STATUS Published**

Form PCT/ISA/220 (January 2004)

**DOCKETED**

**DE-DOCKETED**

(See notes on accompanying sheet)

61136-5004-US \*File IDS/PCT Search Report Due: 16 APR-08  
\*File Art. 34 Amendment - Fined: 16 APR-08  
\*File PCT Demand (ISR Deadline) Fined: 16 APR-08

\*Search Report Received - Due: 17 Feb-08  
\*File Abstract Comments - Fined: 16 Feb-08  
\*File Art. 19 Amendment - Fined: 16 Mar-08

**RECEIVED DOCKETING**

**16 JAN 2008**  
MORGAN LEWIS  
PALO ALTO OFFICE

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 61136-5004WO	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US 06/38024	International filing date ( <i>day/month/year</i> ) 29 September 2006 (29.09.2006)	(Earliest) Priority Date ( <i>day/month/year</i> ) 28 September 2005 (28.09.2005)
Applicant AB-CWT LLC		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed  
☐ a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

- ☐ the text is approved as submitted by the applicant  
☒ the text has been established by this Authority to read as follows:

Depolymerization of organic and non-organic waste materials into useful products

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant  
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 1  
☐ as suggested by the applicant  
☒ as selected by this Authority, because the applicant failed to suggest a figure  
☐ as selected by this Authority, because this figure better characterizes the invention
- b. ☐ none of the figures is to be published with the abstract

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 06/38024

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - C01B 7/19 (2007.01)

USPC - 423/484

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
USPC - 423/484

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
None

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PUBWEST (USPT, PGPB, USOC, EPAB and JPAB); Google Scholar

Search terms: conversion of waste, fuel, fertilizer, food, depolymerization at 700 degrees F, hydrotreating, hydrolysis, slurry

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 2004/0192980 A1 (APPEL et al), 30 September 2004 (30.09.2004), paras [0002], [0029] - [0031], [0033] - [0034], [0047] - [0050], [0055], [0056], [0059] - [0062], [0066], [0067], [0080], [0099], [0114], [0105], [0106]	1-6, 8-14, 18-20 and 24-32 ----- 7, 15-17 and 21-23
Y	US 6,822,126 B2 (MILLER et al), 23 November 2004 (23.11.2004), col 1 ln 15-16; col 2 ln 56	7
Y	US 5,359,061 A (EVANS et al), 25 October 1994 (25.10.1994), col 1 ln 22-27; col 22 ln 42; col 3 ln 11; col 27 ln 47-48 and 51; col 16 ln 61 and 67	15-17, 21-23

☐ Further documents are listed in the continuation of Box C. ☐

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

26th June 2007 (26.06.2007)

Date of mailing of the international search report

16 JAN 2008

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents  
P.O. Box 1450, Alexandria, Virginia 22313-1450  
Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300  
PCT OSP: 571-272-7774

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

# PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: Ada O Wong  
Morgan Lewis & Bockius LLP  
2 Palo Alto Square  
3000 El Camino Real Suite 700  
Palo Alto CA 94306

Date of mailing  
(day/month/year) **16 JAN 2008**

Applicant's or agent's file reference  
**61136-5004WO**

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
**PCT/US 06/38024**

International filing date (day/month/year)  
**29 September 2006 (29.09.2006)**

Priority date (day/month/year)  
**28 September 2005 (28.09.2005)**

International Patent Classification (IPC) or both national classification and IPC  
**IPC(8) - C01B 7/19 (2007.01)**  
**USPC - 423/484**

Applicant **AB-CWT LLC**

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

**3. For further details, see notes to Form PCT/ISA/220.**

Name and mailing address of the ISA/US  
Mail Stop PCT, Attn: ISA/US  
Commissioner for Patents  
P.O. Box 1450, Alexandria, Virginia 22313-1450  
Facsimile No. 571-273-3201

Date of completion of this opinion  
**26th June 2007 (26.06.2007)**

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300  
PCT OSP: 571-272-7774

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 06/38024

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed  
☐ a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing  
☐ table(s) related to the sequence listing

b. format of material

- ☐ on paper  
☐ in electronic form

c. time of filing/furnishing

- ☐ contained in the international application as filed  
☐ filed together with the international application in electronic form  
☐ furnished subsequently to this Authority for the purposes of search

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims	<u>7, 11, 13, 15-17, 20-25, 27</u>	YES
	Claims	<u>1-6, 8-10, 12, 14, 18-19, 26, 28-32</u>	NO
Inventive step (IS)	Claims	<u>NONE</u>	YES
	Claims	<u>1-32</u>	NO
Industrial applicability (IA)	Claims	<u>1-32</u>	YES
	Claims	<u>NONE</u>	NO

**2. Citations and explanations:**

Claims 1-6, 8-10, 12, 14, 18-19, 26 and 28-32 lack novelty under PCT Article 33 (2) as being anticipated by US 2004/0192980 A1 to Appel et al (hereinafter 'Appel').

Regarding claim 1, Appel teaches a process for producing a fuel from a feedstock (para [0002]), comprising: preparing a slurry from the feedstock (para [0031]); subjecting the slurry to a depolymerization process to form a composition comprising at least one inorganic material and a liquid mixture (para [0031] first reaction, para [0033] reacted solid product comprises one mineral, para [0061] breakdown and para [0049] break long molecular chains); separating said at least one inorganic material from the liquid mixture (para [0031]); and deriving a fuel from said liquid mixture (paras [0031], [0029] and [0056]).

Regarding claim 2, see claim 1 explanation above. Further Appel teaches that the feedstock comprises animal manure, sludge, byproducts of food manufacture and distribution, waste plastics, rubber, or tires (paras [0050] and [0055]).

Regarding claim 3, see claim 1 explanation above. Further Appel teaches that the feed stock is a hydrocarbon-based feedstock (paras [0047] and [0048]).

Regarding claim 4, see claim 1 explanation above. Further Appel teaches adding an organic solvent to the slurry prior to said preparing or heating (paras [0059] and [0055]).

Regarding claim 5, see claim 1 explanation above. Further Appel teaches that the feedstock is an organic feedstock (para [0050]).

Regarding claim 6, see claim 1 explanation above. Further Appel teaches that the deriving comprises subjecting the liquid mixture to a thermal conversion process (para [0106] third stage reaction at 310-510 degrees C and para [0105] output is hydrocarbon vapor and gases).

Regarding claim 8, see claim 1 explanation above. Further Appel teaches a fuel oil produced by the process of claim 1 (paras [0002] and [0034]).

Regarding claim 9, see claim 1 explanation above. Further Appel teaches a method of fueling a combustion-driven device comprising powering said device with a liquid mixture produced by the process of claim 1 (para [0030]).

Regarding claim 10, Appel teaches a process for producing a fertilizer from a feedstock (paras [0002] and [0066]), comprising: preparing a slurry from the feedstock (para [0031]); heating the slurry at a temperature sufficient to depolymerize said feedstock into a composition comprising at least one inorganic material and a liquid mixture (paras [0031], [0061], [0049], [0060] subjected to heat, para [0033] reacted solid product comprises one mineral); separating said at least one inorganic material from the liquid mixture (para [0031]); and deriving a fertilizer from said liquid mixture (paras [0031], [0029] and [0066]).

Regarding claim 12, Appel teaches a process for producing a food from a feedstock (para [0029] specialty organic chemicals like fatty acids) comprising: preparing a slurry from the feedstock (para [0031]); heating the slurry at a temperature sufficient to depolymerize said feedstock into a composition comprising at least one inorganic material and a liquid mixture (paras [0031], [0032] heated slurry to 1st temperature, para [0033] reacted solid product comprises mineral); separating said at least one inorganic material from the liquid mixture (para [0031]); and deriving a food from said liquid mixture (paras [0029], [0031], [0114]).

-----continued in supplemental box-----

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

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**Box No. VII Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
There is no reference to Fig # in para [0080] for the numeral 120 and numeral 110 in para [0079].

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

BOX V(2) Citations and Explanations:

Regarding claim 14, Appel teaches a process of converting shredder residue into oil (para [0029] and para [0050] electronics like old computers), comprising:  
dissolving the shredder residue in a solvent (para [0034] dissolving tires in solvent);  
preparing a slurry from the shredder residue (para [0031]);  
subjecting the slurry to a depolymerization step to produce a liquid mixture (paras [0031], [0049];  
subjecting the liquid mixture to a hydrolysis step to produce an organic liquor (para [0062] can further encompass hydrolysis, para [0031] treated liquid product); deriving an oil from said organic liquor (paras [0034] and [0029] oil).

Regarding claims 18 and 19, see explanation for claim 14 above. Further Appel teaches that the solvent is oil obtained from said converting (para [0055]).

Regarding claim 26, see explanation for claim 14 above. Further Appel teaches a fuel oil manufactured by the process of claim 14 (paras [0034] and [0029]).

Regarding claims 28 and 29, see claim 1 explanation above. Further Appel teaches that deriving comprises subjecting the liquid mixture to a hydrolysis step to form an organic liquor; converting said organic liquor into a fuel and converting comprises hydrotreating the liquid mixture (para [0105]).

Regarding claim 30, see claim 1 explanation above. Further Appel teaches that converting comprises subjecting the liquid mixture to a thermal conversion process (para [0105] around 400 degrees C).

Regarding claim 31, see claim 1 explanation above. Further Appel teaches that the feedstock comprises fats, grease, and/or a protein source (para [0050]).

Regarding claim 32, see claim 1 explanation above. Further Appel teaches that the feedstock comprises animal waste, plant waste, waste, or low value streams from ethanol production facilities (para [0050]).

Claims 11, 13, 20, 24, 25, 27 lack an inventive step under PCT Article 33(3) as being obvious over Appel.

Regarding claim 11, see claim 10 explanation above. Further Appel teaches that the water produced by the waste treatment process finds application as a fertilizer (paras [0066] and [0099]). Although Appel does not specifically teach a method of fertilizing a plant by applying a fertilizer produced by the process of claim 10, this would have been obvious to a person skilled in the art at the time of the invention in view of Appels disclosure.

Regarding claim 13, Appel teaches that the products obtained from his process are used to prepare useful materials like fatty acids (para [0029]) and in agricultural applications (para [0114]). It is well known that animal feeds comprise agricultural materials and products with fatty acids. In the light of this disclosure of Appel, although Appel does not teach a method of feeding an animal with a food produced by the process of claim 12, such method would have been obvious to a person skilled in the art at the time of the invention.

Regarding claim 20, Appel teaches a process of converting a raw stream comprising shredder residue and one or more tire into fuel (paras [0029] and [0050] electronics like old computers), comprising:  
dissolving a raw stream comprising shredder residue and one or more tire in a solvent to produce a slurry (paras [0034] and [0031]);  
subjecting the slurry to a depolymerization step to produce a liquid mixture (paras [0031], [0049]);  
subjecting the liquid mixture to a hydrolysis step to produce an organic liquor (para [0062] can further encompass hydrolysis, para [0031] treated liquid product); deriving an oil from said organic liquor (paras [0034] and [0029] oil).  
Although Appel teaches both shredder residue and one or more tire residue as feed stock, he does not specifically teach a combination of both shredder residue and tire residue in the raw stream, But such combination would have been obvious to a person skilled in the art at the time of the invention.

Regarding claims 24 and 25, see explanation for claim 20 above. Further Appel teaches that the solvent is oil obtained from said converting (para [0055]).

Regarding claim 27, see explanation for claim 20 above. Further Appel teaches a fuel oil manufactured by the process of claim 20 (para [0034] and [0029]).

Claim 7 lacks an inventive step under PCT Article 33(3) as being obvious over Appel in view of US 6,822,126 B2 to Miller et al. (hereinafter 'Miller').

Regarding claim 7, see explanation for claim 7 above. Further Appel teaches that a deriving process is by various techniques for the liquid mixture (paras [0067] and [0080]).  
Miller relates to a method for transforming waste polymeric materials into useful products (col 1 ln 15-16) and teaches that deriving comprises hydrotreating the liquid mixture (col 2 ln 56).  
It is proper to combine Appel and Miller as they are both in the same art of waste treatments to form useful products, and it would have been obvious to provide a process as per claim 7, at the time of the invention by combining the teachings of Miller and Appel.

-----continued in next supplemental box-----



WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 06/38024

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

BOX V(2):

Claims 15-17, 21-23 lack an inventive step under PCT Article 33(3) as being obvious over Appel in view of US 5,359,061 A to Evans et al (hereinafter 'Evans').

Regarding claim 15, see explanation above for claim 14. Further Evans relates to method of treating wastes (col 1 in 22-27) and specifically teaches auto shredder residue as feed stock (col 22 in 42). Evans also teaches that depolymerization step takes place at a temperature in the range of about 700.degree. F. to about 775.degree. F (col 3 in 11 slurring at 500-700 degrees F). It is proper to combine Appel and Evans as they are both in the same art of waste treatments to form useful products, and it would have been obvious to provide temperature ranges as per claim 15, at the time of the invention by using the teachings of Evans in a process of Appel.

Regarding claim 16, see explanation above for claim 14. Further Evans teaches that hydrolysis step takes place at a temperature in the range of about 440.degree. F. to about 500.degree. F (col 27 in 47-48 wherein solvolysis/hydrolysis and col 27 in 51 insitu; col 16 in 61 and 67). Claim 16s temperature range in degree F falls within the range of that of Evan in celcius and translates to about equivalent temperatures in F as per claim 16.

Regarding claim 17, see explanations above for claims 14 and 16. Further Evans teaches that depolymerization step takes place at a temperature in the range of about 700.degree. F. to about 775.degree. F (col 3 in 11 slurring at 500-700 degrees F) and said hydrolysis step takes place at a temperature in the range of about 440.degree. F. to about 500.degree. F (col 27 in 47-48 wherein solvolysis/hydrolysis and col 27 in 51 insitu; col 16 in 61 and 67).

Regarding claim 21, see explanations above for claims 20 and 15.

Regarding claim 22, see explanations above for claims 20 and 16.

Regarding claim 23, see explanations above for claims 20 and 17.

Claims 1-32 have industrial applicability as defined by PCT Article 33(4) since the subject matter can be made or used in the industry.